Information Science and Technology Institute

A collection of highly successful, strategic partnerships with leading research universities focused on IS&T topic areas of critical importance to the future of LANL

UCSC/LANL ISSDM

ISTI/IAS Summer Institute
Computer System, Cluster, and Networking

MIT/LANL ISAMI

CMU/LANL IHRPIT

OSU/LANL IRWiN

UC Berkeley/LANL APPMI

Nan Sauer, NSEC Director

Gary Grider, ISTI Director
Carolyn Connor, ISTI Deputy Director

http://institutes.lanl.gov

Institute Roles

➢ Recruit, Retain, Revitalize

➢ Education

➢ Summer schools

➢ National workshops to form collaboration on capability interests/needs

➢ Large persistent University partnerships in large many year investment areas with top universities in those areas to build capability

•*Enrichment/continued education*
•*Degree programs*
•*Seminars*

•*Fill vital Pipelines*

•*Pilot projects in key investment areas*
•*Students*
•*Collaboration*
•*Opportunity to partner on non-FFRDC proposals (via NMC)*

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September, 2008
LA-UR-08-05605

ISTI
INFORMATION SCIENCE & TECHNOLOGY INSTITUTE

The Value

➤ Collaborative Research Program

- Students/Faculty introduced to relevant problems
- Student pipeline on relevant projects
- Funding and fostering of joint LANL/Univ. scientific collaboration (scientific advancement, staff revitalization, incubation/ growth of ext. joint funding opportunities
- CRP proposals solicited annually
- Awards based upon
  - Promising LANL relevant research
  - Collaboration potential (i.e., LANL Collaborator)
  - Potential for future external funding
  - Past and/or future participation in the education program.
- Quarterly Progress Meetings (via video conference)
- Infusion of new ideas, new energy

➤ Staff Outreach Opportunities

- Lecturing/Teaching (seminars, lectures, full courses)
- Mentoring of students
- Infusion of knowledge and ideas through outreach and technical exchange

➤ Education

- Retain/Retrain (3-5 courses per quarter)
- Professional Development (full courses, short courses)
- HEC relevance in curriculum
- Summer school (student pipeline for entry level IT in high turn over areas)

➤ Program Development

- Opportunity to partner on non-traditional funding proposals (via NMC)
- Encourage external funding proposals
  - LANL/UCSC/CMU part of $11M / 5 yr DOE SciDAC Petascale Data Storage Institute, 4-6 students UCSC, 3-4 students CMU
  - LANL/UCSC/CMU part of $2.25M / 3 yr DOE ASCR FASTOS Scalable I/O Forwarding layer
  - UCSC HECURA $900k / 3 yr 4-6 students
  - CMU 2 HECURA awards $1.5M / 3 yr 4-6 students
  - Multiple UC Fee proposals
  - Proposals in the works, more coming (NSF PRObE Facility)
- National engagement and leadership (e.g. HECFSIO)

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ISSDM Collaborative Research Program

➤ **Cosmic Calibration**
- Faculty: H. Lee, B. Sanso UCSC; Student: Tracy Holsclaw
- Mentors: D. Higdon CCS-6; K. Heitmann ISR-1; J. Ahrens CCS-1, S. Habib T-8

➤ **Grammar-guided Feature Extraction from Signals and Images**
- Faculty: H. Tao, D. Helmbold UCSC; Student: D. Eads
- Mentors: J. Theiler, S. Perkins, E. Rosten ISR-2

➤ **CASCC: A Fast Algorithm for Time Series Classification**
- Faculty: Ethan Miller UCSC; Student: D. Eads UCSC
- Mentors: J. Theiler, S. Perkins, A. Fraser ISR-2

➤ **Alternative Reliability Models in Ceph**
- Faculty: Scott Brandt UCSC; Student: D. Bigelow
- Mentors: Grider HPC-DO, Nunez, Bent, HB Chen HPC-5

➤ **COLT: Continuous On-Line Tuning of Databases**
- Faculty: N. Polyzotis UCSC; Student: K. Schnaitter
- Mentors: G. Grider HPC-DO; J. Nunez, J. Bent HPC-5

➤ **Dynamic Load-Balancing in Petabyte-scale File Systems that use Pseudo-Random Data**
- Faculty: Scott Brandt UCSC
- Student: Esteban Molina-Estolano UCSC
- Mentors: G. Grider HPC-DO; J. Nunez, J. Bent HPC-5

➤ **Erasure Codes for Reliability & Recoverability**
- Faculty: D. Long UCSC   Students: R. Wacha UCSC
- Mentors: G. Grider HPC-DO J. Nunez, J. Bent HPC-5

➤ **Boosting for Image Recognition**
- Faculty: M. Warmuth UCSC; Student: K. Glocer
- Mentors: James Theiler ISR-2 Simon Perkins ISR-2

➤ **Exploring Uncertainty Visualization in Large Data Sets**
- Faculty: A. Pang UCSC; Student: E. Chandra UCSC
- Mentors: Katrin Heitmann ISR-1; James Ahrens CCS-1

➤ **Sensing Human Shape and Motion**
- Faculty: J. Davis UCSC; Student: Steve Scher UCSC
- Mentor: Sriram Swaminarayan CCS-2

➤ **Information Trust**
- Faculty: L. de Alfaro UCSC; Student: I. Pye UCSC
- Mentors: S Spearing, J Roman HPC-1; L Collins STBPO-RL

➤ **Interactive Search and Browsing**
- Faculty: Yi Zhang UCSC; Student: J. Gronski UCSC
- Mentor: Herbert Van de Sompel STBPO-RL

➤ **Network Quality of Service**
- Faculty: S. Brandt UCSC; Student: A. Shewmaker
- Mentors: G. Grider, HPC-DO

➤ **Web Based Pathogen Information System**
- Faculty: Yi Zhang UCSC; Student: tbd
- Mentors: Carla Kuiken T-10

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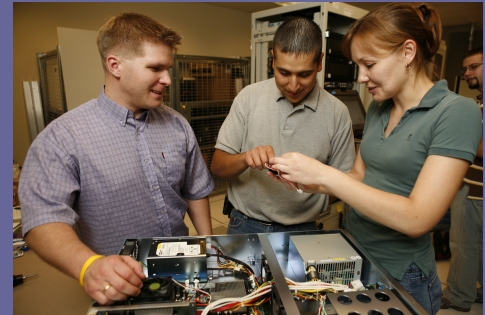# Computer System, Cluster, and Networking Summer Institute

summary

Co-sponsored by the Information Science and Technology Institute (ISTI) and the Institute for Advanced Studies (IAS), the purpose of the eight-week Summer Institute is to identify a select group of highly capable, upper-division (Junior and Senior) undergraduate students currently attending New Mexico Universities and to provide those students with an outstanding, in-depth, and highly-practical summer opportunity.

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New Mexico Consortium's
IAS
Institute for Advanced Studies
at Los Alamos National Laboratory

✓ Hands-on practical skill development

✓ Teaming and communication skills.

✓ Development of technical breadth via guest lectures, tours, and interactions with LANL mentors, computer professionals, and scientists

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U N C L A S S I F I E D

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New Mexico Consortium's
IAS
Institute for Advanced Studies
at Los Alamos National Laboratory

2007 Computer System, Cluster, and Networking Summer Institute

Success beyond expectations

- ✓ An excellent collaboration between IAS, ISTI, HPC, and CTN
- ✓ 9 students in teams of 3 built computer clusters from scratch and then completed relevant projects on their clusters
- ✓ Two technical presentation awards at the Student Symposium
- ✓ Out of 9 total students:
  - ✓ Three existing LANL interns broadened themselves for their home divisions in B, ES, and CTN-4;
  - ✓ 100% placement of remaining six participants in CTN 1,2,3,5 & HPC-5;
  - ✓ ~90% remaining with LANL or returning to LANL for Summer 2008.
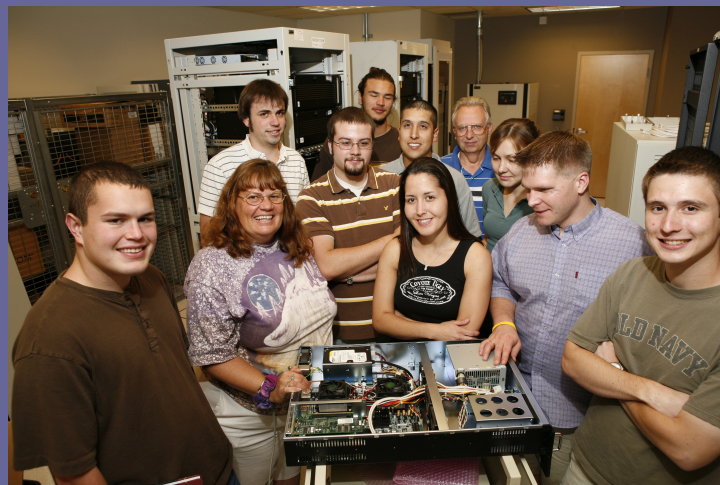
I S T I

INFORMATION SCIENCE & TECHNOLOGY INSTITUTE

2008 Computer System, Cluster, and Networking Summer Institute

ISTI
INFORMATION SCIENCE & TECHNOLOGY INSTITUTE

Success beyond expectations

9 students in teams of 3 built computer clusters from scratch and then completed relevant projects on their clusters

✓Projects (presented at 2008 LANL Student Symposium):

  ✓"High Performance Computing with Configuration Management"

  ✓"Diskless Computing"

  ✓"High Speed Interconnection Network Performance Studies"

✓So Far, 4 students have been offered and have accepted internships (in HPC, DCS, and INST Divisions)

  ✓With more connections being made.

18 SI Graduates to date:
NMHU – 3   NMSU – 2
NMT – 2   UNM – 5
UNM- Los Alamos – 3
Out of State Schools - 3

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New Mexico Consortium's
IAS
Institute for Advanced Studies
at Los Alamos National Laboratory

Professional Development
Formal Degree Opportunities
Revitalization
Retraining

ISSDM Distance Learning Program

- **UCSC Graduate Computer Science and Computer Engineering Courses offered**

Sem.	Year	Course
fall	2006	Analysis of Algorithms
fall	2006	Advanced Operating Systems
winter	2007	Computer Architecture
winter	2007	Independent Study Storage systems
winter	2007	Storage Systems
spring	2007	Topics in Compu...
spring	2007	Network Se...
spring	2007	Distributed S...
spring	2007	Compiler Desig...
spring	2007	Artificial Intellige...
fall	2007	Languages and Environments
fall	2007	Principles of Database Systems
fall	2007	Computer Networks
fall	2007	Computer Architecture
winter	2008	Parallel Processing
winter	2008	Machine Learning

spring	2008	High Speed Netwo...
spring	2008	Image An...
spring	2008	C...
spring	2008	...
spring	...	...Computer S...
...	...	...matics Models and Algorithms
...	...	...Computer Architecture
...	...	Computer Networks
...	2008	Analysis of Algorithms
fall	2008	Database Systems I: Principles of Database Systems
winter	2009	Advanced Operating Systems
winter	2009	Languages and Environments
winter	2009	Machine Learning
winter	2009	Parallel Processing
winter	2009	Sensor Networks
spring	2009	Advanced Computer Security
spring	2009	Advanced Topics in Machine Learning
spring	2009	Topics in Database Systems

Provides opportunity for Technical Staff and Post-baccalaureate student interns to pursue graduate studies while working at the Laboratory

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Much to do…

Thank You

Much to Celebrate…

http://institutes.lanl.gov/